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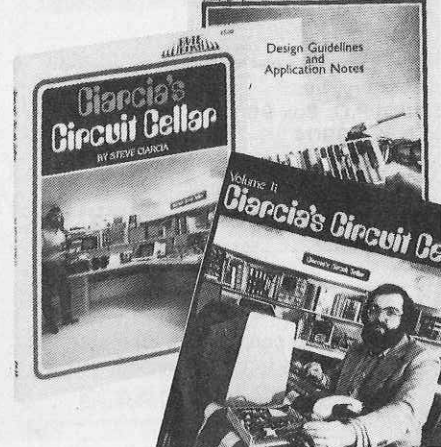
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STEVE CIARCIA is a Computer Consultant, Electrical Engineer, and author of "Ask Byte" and "Ciarcia's Circuit Cellar" columns in BYTE magazine.

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PROGRAM MERGING ON A TRS-80

Machine-language utility permits combining two programs

BY JAMES L. FRIDDLE

UNLESS you have an expansion interface and disk system, adding a subroutine to one or more BASIC programs in a TRS-80 means typing. And if the subroutine is long or often used, it means lots of typing, which can generate errors in your work as well as fatigue.

The machine-language program in Listing 1 allows you to load a BASIC program from cassette tape into memory and combine it with a BASIC program already in memory, using the Level-3 MERGE command. (This assumes that the second program has line numbers higher than the program already in memory.) If you are unfamiliar with machine-language programming, Listing 2 comprises a BASIC program that will POKE the MERGE routine into protected memory, and then erase itself. Since the MERGE routine contains only relative addressing, it can be located at any block of memory the user desires. If

the addresses given in the listing are retained, the KBFIX routine can be used as well. When using the MERGE routine, enter 32594 for MEMORY SIZE? when the TRS-80 is turned on. Address 418CH must be loaded with MERGE program address, in this case 7F53H. Once this has been accomplished, then activating the MERGE command, starts the program.

To use the MERGE command, enter your main program after making sure that its highest line number does not encroach on the lowest line number of the subroutine. Place the cassette containing the previously recorded subroutine in the recorder, press the play button, and enter the command MERGE. The recorder will start; and when the program is found, the usual asterisks will appear. When the cassette stops, enter LIST and verify that there is a single program containing the original main program with the appended subroutine. ◇

LISTING 1

Add.	Code	Line#	Mnemonics	Remarks
7F53		010	ORG 7F53H	
		020		;L2MERGE VERSION 2.0
7F53	DD 2A F9 40	030	LD IX, (40F9H)	;GET LINE # POINTER
7F57	DD 2B	040	DEC IX	
7F59	DD 2B	050	DEC IX	;LINE POINTER ADDR
7F5B	DD 2B	060	DEC IX	
7F5D	DD 2B	070	DEC IX	
7F5F	AF	080	XOR A	
7F60	CD 12 02	090	CALL 0212H	;DEFINE DRIVE
7F63	CD 96 02	100	CALL 0296H	;FIND SYNC BYTE
7F66	06 04	110	LD B,4	;READ FIRST 4 BYTES
7F68	CD 35 02	120 LP1	CALL 0235H	;READ BYTE
7F6B	10 FB	130	DJNZ LP1	;DONE?
7F6D	CD 35 02	140 LP2	CALL 0235H	;LOAD BASIC TAPE
7F70	DD 77 02	150	LD (IX+2),A	;PUT BYTE IN MEM
7F73	B7	160	OR A	
7F74	20 08	170	JR NZ, SKP	
7F76	3A 3F 3C	180	LD A, (3C3FH)	;CHANGE *
7F79	EE 0A	190	XOR OAH	
7F7B	32 3F 3C	200	LD(3C3FH),A	; * CHANGED
7F7E	AF	210 SKP	XOR A	;O A & RESET FLAGS

7F7F	DD B6 00	220	OR (IX)	;TEST FOR TAPE END
7F82	DD B6 01	230	OR (IX+1)	
7F85	DD B6 02	240	OR (IX+2)	
7F88	DD 23	250	INC IX	
7F8A	20 E1	260	JR NZ,LP2	;IF NOT END DO AGAIN
7F8C	CD F8 01	270	CALL 01F8H	;TURN OFF CASSETTE
7F8F	2A F9 40	280	LD HL,(40F9H)	;GET LINE # POINTER
7F92	E5	290	PUSH HL	
7F93	DD E1	300	POP IX	
7F95	11 EB 42	310	LD DE,42EBH	
7F98	ED 52	320	SBC HL,DE	;HL IS DISPLACEMENT
7F9A	E5	330	PUSH HL	
7F9B	D1	340	POP DE	
7F9C	DD 2B	350	DEC IX	
7F9E	DD 2B	360	DEC IX	
7FA0	DD 6E 00	370	CHANGE LD L,(IX)	;CHANGE ADDR LOOP
7FA3	DD 66 01	380	LD H,(IX+1)	
7FA6	AF	390	XOR A	
7FA7	7C	400	LD A,H	
7FA8	B5	410	OR L	
7FA9	28 0D	420	JR Z,EXIT	;IF FINISHED EXIT
7FAB	AF	430	XOR A	
7FAC	19	440	ADD HL,DE	
7FAD	E5	450	PUSH HL	
7FAE	DD 75 00	460	LD (IX),L	
7FB1	DD 74 01	470	LD (IX+1),H	
7FB4	DD E1	480	POP IX	;IX NOW NEW ADDRESS
7FB6	18 E8	490	JR CHANGE	;REPEAT TILL DONE
7FB8	DD E5	500	EXIT	
7FBA	E1	510	POP HL	
7FBB	23	520	INC HL	
7FBC	23	530	INC HL	
7FBD	22 F9 40	540	LD (40F9H),HL	;UPDATE LINE# POINTERS
7FC0	22 FB 40	550	LD (40FBH),HL	
7FC3	22 FD 40	560	LD (40FDH),HL	
7FC6	C3 19 1A	570	JP 1A19H	;RETURN TO "READY"
7F53		580	END	

LISTING 2

1	REM MERGE 2.0 BASIC LOAD JLF 6/29/80
2	REM ENTER 32594 FOR MEMORY SIZE ON POWERUP
10	FOR X=32595 TO 32712
20	READ Y:POKE X,Y
30	NEXT
40	DATA 221,42,249,64,221,43,221,43,221,43,221,43,175,205,18,2,205,150,2,6,4,205,53,2,16,251,205,53,2,221,1,119,2,183,32
50	DATA 8,58,63,60,238,10,50,63,60,175,221,182,0,221,182,1,221,182,2,221,35,32,225,205,248,1,42,249,64,229,221,225,17,235,66
60	DATA 237,82,229,209,221,43,221,43,221,110,0,221,1,102,1,175,124,181,40,13,175,25,229,221,1,117,0,221,1,116,1,221,225,24,232,221
70	DATA 229,225,35,35,34,249,64,34,251,64,34,253,64,195,25,26
80	POKE 16780,83:POKE 16781,127
90	NEW

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six	fifty	20ms	silence	fuel	lesser	parenthesis	start	i	z
seven	sixty	60hertz	tone	go	low	please	than	k	
eight	seventy	40ms	silence	gallon	limit	percent	stop		
nine	eighty	160ms	silence	gram	lower	plus	the	l	
ten	ninety	320ms	silence	great	mark	point	time	m	
eleven	hundred	centil	greater	meter	pound	try	n		
twelve	thousand	check	have	mile	pulses	up	o		
thirteen	million	comma	high	milli	rate	volt	p		
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